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Lawrence J. Faessler

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Lawrence J. Faessler
Lt. Col. USAF

Cornell University

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I. INTRODUCTION

"We have learned and must not forget, that from now on, air transport is an essential of air power, in fact, of all national power."[1] General Arnold formulated this doctrine and related it to Secretary Stimson in February 1945. USAF basic doctrine fosters this principle in stating that our strategic and tactical military airlift can deploy our forces to any part of the world and support them.[2] Whether this can be achieved with existing capabilities is judgemental. Driven by fiscal realities, tactical airlift modernization continues to be deferred as C-130, C-123 and C-7 airlift continue to age. In September 1979, Secretary of the Air Force, Dr. Mark, iterated that modernization of tactical airlift, as well as strategic airlift, had one of the highest Air Force priorities, second only to enhancement of strategic forces.[3] General Jones, Chairman of the Joint Chiefs of Staff, in the supplement to the military posture statement for 1980 indicated the tactical airlift force will reach the end of its economic service life in the early 1980s. In addition, it was reported that today's tactical airlift can carry only about one-third of the U.S. Army's division combat equipment items.[4] General Moore, recently retired Commander-in-Chief of the Military Airlift Command, complemented this latter notion. He said the C-130 is being outgrown as U.S. Army ground forces modernize with larger and heavier firepower. He affirms the JCS contention by stressing that by the 1980s the C-130 will be able to carry less than 50 percent of the Army's equipment and practically none of the Army's new and vital firepower.[5]

Despite the consensus on the need to modernize the tactical airlift force, and in sharp contrast to the priority established by the Secretary of the Air Force, tactical airlift appears to remain low on the scale of relative priorities. The Department of Defense Annual Report for Fiscal Year 1980 says the benefits of modernizing tactical airlift when weighed against expenditures for other programs cannot be justified.[6] In testimony before the U.S. Senate, General Allen, Chief of Staff, USAF, was consistent with Secretary Brown. General Allen indicated, in response to a query from Senator Stennis, that the USAF remains convinced tactical airlift must be modernized. However, he qualified that statement emphasizing that other force modernization efforts have been given a priority higher than that held by tactical airlift.[7]

The present day inadequacy of theater airlift capability warrants a complete rethinking of the relative importance of airlift, vis-a-vis other modernization programs and a refocusing of attention on this area of defense needs. Set in a brief historical perspective of transportation dependence, this paper will attempt to focus attention on tactical airlift modernization, emphasizing the age of existing aircraft and the inability to move the large military firepower hardware of the U.S. Army.

II. HISTORICAL PERSPECTIVE

There are some historical parallels and precedents to be recognized in the last several centuries of military campaigns. Noteworthy are those that highlight dependence upon adequate transportation to achieve military objectives. Supplying the basic rudiments of war has become more challenging through the years. Logistics problems have often become the key determinant in military operations. The 100,000 man force Gustavus Adolphus amassed against Wallenstein in 1631-32 had to march almost continuously in order to feed both men and horses. Local resources were quickly exhausted; hence, armies had to find new food and forage. Almost continuous movement magnified transportation needs. All too often the direction of march was dictated by the availability of supplies and transportation. Even the 17th century magazine supply system of the Frenchmen Le Tellier and Louvois placed demands on transportation, as did the follow-on concept of supplying armies from fixed bases to the rear. The important point to be made here is regardless of the supply system used in war, dependence on transportation, to varying degrees, dictated the relative success or failure of military operations. For example, in 1757, Frederick II had to halt the siege of Olmutz because a convoy of 3,000 vehicles was interdicted. In this case, he had the transportation but failed to afford it sufficient protection. To prevent similar occurrences Frederick II allotted 8,000, 15,000 and 30,000 men to protect important convoys later in the same year.[8]

Realizing the predeliction for siege warfare during the 18th century, Napoleon avoided sieges and their dependence on logistics. In his campaign of 1805 Napoleon is credited with establishing a unique standard of organization and administration of the logistic needs of the "Grande Armee."

Despite a notable shortage of transportation, Napoleon established a line of communications from Strasbourg, France to Augsburg, Germany using sixty four-horse wagons within each of seventeen sections of the route. This shuttling concept provided clothing and ammunition in an unprecedented system of supply and transportation. Napoleon also established an ammunition depot at Heilbronn and later a subsistence depot at Braunau, the forerunners of today's depot concepts. The stationary nature of these depots may be one of the evolutionary steps in the ultimate reliance of modern armies on an umbilical cord of supply, a system that is transportation dependent. It is interesting to note that in support of this depot concept, three of Napoleon's operational corps commanders, Soult, Ney and Bernadotte, were ordered to relinquish control of gravely needed transport to sustain the operation of a supply distribution system. In addition, so critical were these transportation assets and supplies that no less than three divisions were detailed to protect the lines of communication. Napoleon was, of course, successful in his march to Austerlitz, in contrast to his later campaign in Russia.[9]

The geographical route and many of the failures of Napoleon's venture into Russia in 1812 are replicated by the German invasion of Russia in 1941. In both cases transportation dependence had an adverse impact on military operations. The inability to transport forward sufficient supplies prevented sustained operations and severely disrupted the scheduled timetables. Whereas Napoleon's 600,000 man army advanced from East Prussia, passed Minsk and Smolensk enroute to Moscow, Hitler used 144 German divisions (over five times the size of Napoleon's army) with the Army Group Center following the same Napoleonic route. Napoleon's army used horse drawn supply trains and despite the passage of over a century, the

German army also used horse drawn wagons in conjunction with railroads and motorized trucks. As a case in point, during the Russia campaign of WWII, the Wehrmacht resorted to the use of "panje" (a type of peasant cart) to move critical supplies when truck and rail transport failed.

Weather, bad roads (the ineffectiveness of the railroad in Hitler's case) and the resulting inability to move critical supplies forward to consumption points all contributed in the failure to achieve planned military objectives. During the Russian campaign, the mechanized Wehrmacht Panzer units consistently outran their supplies. In many instances roads were congested by infantry troops, roads were impassable because of mud, and trucks were ineffective during the freezing temperatures of winter. Railroads in Russia offered marginal relief. The Russian railroads had different gauge tracks than German railroads; Russian locomotives were larger than German locomotives. German locomotives could not complete the distance between water and refueling points on Russian tracks after the latter were converted to German gauge. Horse drawn wagons, trucks and railroads repeatedly failed to produce the essential tonnages required at the front lines. Hitler used airlift for transportation to avert shortages of fuel and ammunition at the front. Theater airlift, realizing its genesis during World War II, often was the only timely means of transporting the critical supplies, hurdling the congested road and rail networks. For both Napoleon's Grande Armee and Hitler's Wehrmacht logistics, and in particular the ubiquitous paucity of transportation, were critical elements in the outcome of the Russian adventures.[10]

The onset of World War II revealed the U.S. at a nadir in military preparedness. The subsequent meteoric development of military prowess in the Army Air Forces (AAF) is well documented. Air transportation

experienced dramatic improvements during World War II. On 20 June 1942, the Air Transport Command, absorbing missions of the Air Service Command and the Ferry Command, was established by direction of General Hap Arnold. The Ferry Command, established a year earlier (20 May 1941), had been responsible for ferrying aircraft destined for British use (purchased and Lend Lease) from American factories to Canada, to U.S. ports of embarkation and to African airfields. The Air Service Command had been engaged in domestic transport activities previously.[11] In 1941, the concept of air logistics had not been grasped fully as a principal means of supplying forces in the field. As cargo backlogs mounted in the late spring and summer of 1942, it became evident there would be a continuing demand for air transport cargo space and the rapid movement of critical supplies and personnel shaped the concept of air transportation as an instrument of logistics.[12] From January 1942 to August 1945 the AAF shipped 19 million measurement tons overseas by sea, more than a third going to Europe. Between January 1943 and August 1945 the AAF shipped over 45,000 tons overseas by airlift.[13]

"The importance of the transport plane to the operations of the AAF... is illustrated by the growing inventory of planes. In July 1939 the AAF had only 118 transports, and on the eve of Pearl Harbor it had only 216. Thereafter, the inventory rose steadily; by August 1944 the AAF had more than 10,000 transports on hand."[14] The continuing demand for increased airlift capability was evidenced by the number of transport aircraft accepted by the AAF in World War II. Over 10,000 C-47 transport aircraft were received between 1940 and 1945. The C-46 aircraft deliveries reached 3,144 by August 1945, the C-54 aircraft inventory ultimately exceeded 1,000 and the AAF accepted 1,771 C-45s before the war ended. The essentiality

of airlift was evidenced by the conversion of and the use of bombers in an airlift role. The B-24 bomber was modified as a transport aircraft and redesignated as a C-87. The B-24, designated as a C-109, was also modified as a tanker transport aircraft to haul large quantities of fuel "over the hump" from India to China. The "hump" airlift was one of the hallmark achievements of theater airlift during the World War II era.[15] In contrast, had Rommel had the same type of air logistics support from Tripoli to the Egyptian frontier, the outcome of the North African campaign might have been altered considerably. In many cases, Rommel had an adequate amount of supplies delivered to North African seaports, but he experienced considerable difficulty in transporting these supplies on over extended vulnerable lines of communication.[16]

In September 1944, in one notable event highlighting transportation dependence, B-24 operational bombers were diverted from their primary mission and used as transport aircraft to carry vital supplies in the European theater. One wing of Eighth Air Force B-24 bombers were used for intratheater airlift in support of General Patton's Third Army in France. In thirteen days of operation (September 18-30, 1944) 1,601 sorties (not only B-24s) carried 2,589,065 gallons of gasoline from the United Kingdom forward to airfields on the Continent.[17] Projected into the 1980s, this would be the equivalent of B-52 bombers flying 50 gallon drums of diesel fuel for European 7th Army forces, albeit for the same reason - inadequate theater airlift capability or unresponsive surface capability to satisfy emergency demands. Airlift continued to serve an important role as the Third Army advanced into Austria and Czechoslovakia. From March 30 to May 8, 1945 airlift was responsible for the movement of 22 percent (22,500 tons or six million gallons) of all gasoline going to the

Third Army. In addition, 11 percent of the rations received by the Third Army during this time period arrived by airlift.[18] As evidenced by the successes and failures of the "Hump" operation, Rommel in North Africa and Patton's surge through France and Germany, dependence upon adequate logistics, specifically air transportation, is a key ingredient of military operations.

The role of airlift started in WWII expanded during the Vietnam War. Between 1962 and 1973 the USAF delivered over 7 million tons of passengers and cargo within South Vietnam. By comparison, U.S. and British airlift carried about two million tons during the Berlin Airlift.[19] At the height of Vietnam operations approximately ten million tons of cargo was moved by a combination of military and commercial motor transport (December 1967-December 1968). During this same period a combination of Common Service Airlift System C-130, C-123 and C-7 aircraft, plus U.S. Army and U.S. Marine Corps helicopters airlifted over two million tons of cargo within Vietnam. Continuing the same theme, during the January-July 1969 time period, five million tons were transported on the highways and over one million tons were airlifted, reinforcing the same 5 to 1 ratio of surface movement to air movement.[20]

On numerous occasions airlift made notable contributions to military operations. In 1965, the 1st Cavalry Division required a major airlift effort to sustain operations of their assault helicopters against strong NVA forces at the Ploi Mo Camp south of Pleiku. Over a 29 day period tactical airlift delivered 186 tons per day; most of it was POL. In another example, Khe Sanh was resupplied by air during the first four months of 1968. This enabled 6,000 allied defenders to survive under heavy NVA pressure until reopening a land line of communication. Between

21 January and 8 April, 12,400 tons were delivered to Khe Sanh by C-130, C-123 and C-7. Supply levels never failed to sustain the allied force.[21]

Two U.S. Army histories summarize the essentiality of transportation. The Sinews of War: Army Logistics, 1775-1953 says:

> "Probably the most common limiting factor in U.S. Army logistics has been transportation. Whenever shortages of supplies or equipment have appeared at the battle fronts, from the Revolutionary War to the Korean War, more often than not it has been the result of some shortage in transportation somewhere along the line."[22]

> "Generally most transportation difficulties for U.S. Army forces...have been found within the theaters of operations..."[23]

The U.S. Army Vietnam Studies, Logistics Support states:

> "An adequate intra-theater airlift capability must be planned for. Plans for air transporting 10 percent of the anticipated cargo and 65 percent of the total monthly forces should provide an adequate initial capability."[24]

The implication is clear. The need for transportation, and specifically airlift, as captured by military history serves as a herald to those who would recognize its relevance. As George Santayana said, "those who cannot remember the past are condemned to repeat it."

III. AIRCRAFT AGE

Accepting the premises that, historically, transportation has contributed to the success of military operations and air transportation is playing an increasingly more dramatic role, then, next, one must address the question, why modernize tactical airlift now? There are many reasons, but the two most often discussed reasons for modernizing tactical airlift forces are the advanced age of existing C-130, C-123 and C-7 aircraft and the inability of the C-130 to carry large, bulky, outsize equipment of the U.S. Army division force.[25] There is merit in both of these arguments; a brief summary follows.

The Military Airlift Command (MAC) Required Operational Capability (ROC) 9-75 indicates that by 1985 C-130 technology will be more than 35 years old. Compounding this problem is the accelerated aging caused by the Southeast Asia environment.[26]

Table 1

	C-130		C-123		C-7	
Organization	No. of Aircraft	Age* - yrs./mos.	No. of Aircraft	Age - yrs./mos.	No. of Aircraft	Age - yrs./mos.
Active USAF	381	12/6				
Air National Guard	179	19/8			17	14/4
Air Force Reserve	148	19/0	63	23/6	32	14/0

*All age figures reflect a January 1980 status.[27]

The above table reflects the advanced age of the total USAF tactical airlift inventory. By comparison, the average age of F-4 fighter aircraft, another Air Force mainstay, is: Active USAF - 11 years and 4 months,

ANG - 14 years and 4 months, and AFR - 15 years and 2 months. The Active Force C-130 is one year and 2 months older, the ANG is 5 years and 4 months older and the AFR is 3 years and 10 months older. In a program to be applauded, the F-4 aircraft is being replaced by new fighter aircraft.

To carry the age argument one step further, the C-123 aircraft, one of our primary short take off and landing (STOL) aircraft, is almost 24 years old. The C-123 ranks number three as the oldest USAF aircraft in the Air Reserve Forces behind the B-57 (25 years, 2 months) and the C-131 (24 years, 5 months). Maintaining the 63 C-123 aircraft is extremely difficult. The age of the relatively few aircraft increases the cost of individual aircraft spare parts. The same problem of uniqueness exists for the 49 C-7 aircraft, though they are not quite as old. A USAF comparative cost effectiveness analysis of alternative tactical airlift aircraft concluded that a 6% to 9% savings could be realized by retiring the C-7, C-123 and older C-130 aircraft from the Air Reserve Forces and replacing them with the newer C-130 aircraft from the Active USAF. The Active USAF C-130 aircraft should be replaced by advanced medium STOL aircraft (AMST).[28]

The Posture of Military Airlift Report of the House Armed Services Committee (HASC No. 94-40) cites a June 1970 report that points out the programmed tactical airlift force for 1974 is not encouraging. In fact, the tactical airlift situation was then projected to be comparable to the "deplorable" strategic airlift force of 1960. Witnesses testified C-7, C-123 and C-130 replacements were required, as was an airlift aircraft with STOL capability. Moreover, the report cites AF Secretary Brown's testimony in 1966 admitting a possible need for a STOL aircraft to fill the gap existing between the capabilities of the C-130 and helicopters.

The 1966, 1970 and 1976 subcommittee reports recognized the age of the tactical airlift force and supported the AF modernization program. In addition, the subcommittee report acknowledges engineer age acceleration estimates for aircraft operated in Southeast Asia. These aircraft experienced fatigue rates ten times higher than anticipated when designed, contributing to the age problem. Although the AF has procured over 100 new C-130 aircraft since the 1970 subcommittee report, the posture of tactical airlift STOL capability has not improved in ten years.[29]

The Congress has expressed recent concern over the Air Force tactical airlift modernization program. In his report to the Congress on DOD Authorizations for FY 1980, the Honorable Mr. Price, HASC, recommended an authorization of $79.690 million to continue the C-130 procurement program so that older, obsolete C-130A aircraft could be phased out. The USAF aircraft procurement request for FY 80 had not contained a request for C-130 aircraft.[30] In a subsequent action, a joint House/Senate conference approved the C-130H procurement funding level. Thus the Air Force is procuring eight new unrequested C-130s.

Lest we forget, both Napoleon and Hitler, despite over one century of time, used horse drawn wagons in supporting their quests in Russia. Hitler had limited success resupplying Panzer units with airlift. Tactical airlift in greater quantities might have added a new dimension to Wehrmacht tactics. Dependency on transportation, then as well as now, must be a prime concern in planning future operations.

IV. U.S. ARMY EQUIPMENT

Central to discussions on modernizing tactical airlift is the requirement for the U.S. Air Force to be able to airlift complete U.S. Army units, including equipment, within an overseas theater. Supporting arguments are scenario dependent. It is reasonable to postulate a situation that will require the rapid movement of U.S. Army units from one flank of Europe to another or forward from a reserve position in the rear. Consider strategic reserve divisions located in Belgium and required in Turkey. Also consider the deployment of prepositioned European equipment, such as tanks and artillery, to the Persian Gulf simultaneously with the deployment of forces located in the continental U.S. These require a theater aircraft capable of moving outsize cargo for a response to be successful without withdrawing resources from the strategic airlift role.

Modern command and control capabilities have broadened a commander's ability to observe, react and influence the battle. Quantum improvements in battlefield surveillance have increased the potential for commanders to receive early indicators of threats and/or opportunities for offensive battlefield movements. Responding to threats and opportunities is contingent on the adequacy and flexibility of transportation systems. The value of the improved detection systems is lost without the ability to react and seize the opportunity.

One dissenting argument from opponents of the AMST is the lack of an historical precedent for unit moves via airlift. The counter argument suggests the airlift capability must exist before the concept can be exercised.

Accepting the above preconditions of scenario dependency, the argument to modernize tactical airlift because of the changing nature of U.S. Army

unit equipment is equally cogent. In the 1950s, the U.S. Army was primarily infantry oriented and battlefield mobility was not their long suit. In 1954, for instance, about when the C-130 aircraft was being designed, the U.S. Army consisted of two airborne, 13 infantry and only three armored divisions.[31] By comparison, the U.S. Army for 1985 is programmed to have 11 or 12 heavy armored or mechanized divisions and 4 or 5 light airborne, airmobile and infantry divisions. This, of course, assumes the U.S. Army achieves program objectives.

Since the U.S. Army has been undergoing extensive equipment modernization to achieve greater firepower potential and battlefield mobility, the USAF undertook a study, as yet unpublished, that measures the USAF capability to airlift typical Army units now (1978) and in the future (1986).[32] The study dramatizes the increased size and weight of Army units projected to exist in 1986.

The study reports some 99 equipment modernization programs that will alter the cargo profile of units deploying via airlift. For instance, the M551 Sheridan tank is being phased out of the inventory. Where a replacement is required the M60 and XM-1 tanks will be used, thereby replacing oversize equipment that could be airlifted on a C-130 with a tank that can only be airlifted by a C-5 aircraft or a modern tactical airlift aircraft with outsize airlift capability. The list continues. The Army plans to replace the M60A1 tank with heavier M60A3 and XM-1 tanks. The C-130 cannot airlift any of these pieces of equipment. The number of 155mm self-propelled howitzers in heavy divisions will be increased from 54 to 72, thereby raising the total weight of the divisions and increasing the amount of cargo that cannot deploy via C-130. Replacing the M113 Armored Personnel Carriers with the Infantry Fighting Vehicles will increase the

amount of cargo outsize to C-130 capability and, finally, replacing the Vulcan Air Defense Gun with Division Air Defense (DIVAD) Guns adds greater quantities of outsize equipment. These are but a few examples of the impact of the U.S. Army equipment modernization programs that must be considered in selecting a follow-on aircraft to replace the C-130.[33]

The changing shape of the Army's equipment can be dramatized another way. A simple comparison of total weight by unit type demonstrates clearly the increased total cargo weight caused by the modernization program.

Table II[34]

Unit Type	1978 Weight (S/T)*	1986 Weight (S/T)
Armored Cavalry Regiment	12,950	19,691
Air Assault Divison	17,040	20,107
Airborne Division	16,731	20,438
Infantry Division	30,392	37,521
Mechanized Division	51,167	63,768
Armored Division	57,393	70,807

* S/T = Short Ton or 2000 lbs.

Unfortunately, as demonstrated below, too much of the added weight of these units is in items of equipment that will not fit on existing tactical airlift aircraft. Table III shows the amounts of unit equipment by weight that cannot fit on C-130 and AMST aircraft presently (1978) and in the future (1986).

Table III[35]

S/Tons beyond capability of, or outsized to:	1978	1986
Armored Cavalry Regiment		
AMST	835	835
C-130H	5,480	14,721
Air Assault Divison		
AMST	593	767
C-130	754	988
Airborne Division		
AMST	30	503
C-130	74	1,849
Infantry Division		
AMST	1,467	1,271
C-130	7,640	13,002
Mechanized Division		
AMST	1,725	2,412
C-130	21,802	36,234
Armored Division		
AMST	1,944	2,771
C-130	29,439	42,891

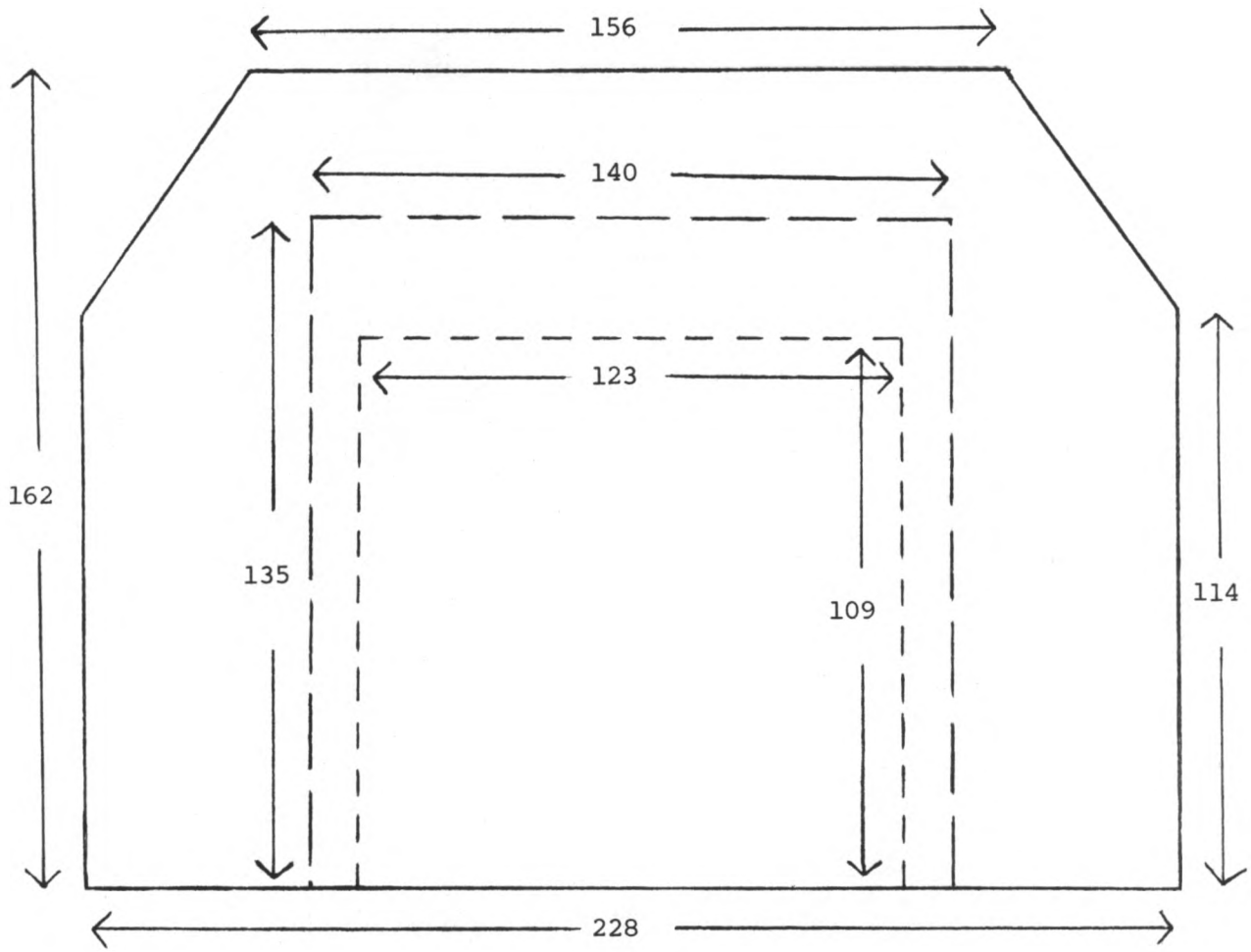
In sum, the worst fears of our military leadership are well founded. The USAF study makes it clear that our present tactical airlift force of C-7, C-123 and C-130s cannot airlift 42% of the unit equipment of a U.S. Army armored cavalry regiment (ACR) now and will be unable to airlift almost 75% of an ACR's equipment in 1986. For mechanized and armored divisions, that could comprise three-fourths of our active U.S. Army divisions in 1986, the C-130 will be unable to carry almost 57% and 61%

of division equipment respectively. One additional point is very important. The tanks, armored vehicles and artillery that cannot be airlifted are the very items that will be most decisive in altering the outcome of a battle.

Figure 1 shows the door openings and relative sizes of airlift aircraft. Graphically portrayed, it is apparent that large, bulky, outsize equipment that fit on the C-5 aircraft will not fit on the C-130. This graphic dramatically demonstrates the uniqueness of the C-5 as the only aircraft capable of moving the U.S. Army. This uniqueness could set up the counterproductive, competitive demands for using the C-5 (and later the C-X) in strategic and tactical roles if an outsize cargo capable theater airlift aircraft does not exist. In fact, an argument can be made not to build a new tactical airlift aircraft that will fulfill military needs beyond the turn of the century unless it can accommodate all of the equipment deployable on the C-5 and the new C-X aircraft.

One can only speculate on the scenarios of the next war and whether tactical airlift will be the mover of large pieces of military firepower or boxes of supplies. Yet we could predetermine the future by ignoring the theater outsize airlift need. Having only oversize tactical airlift capability available will ensure that the options of moving complete U.S. Army units by theater airlift will not be available.

Figure 1: End Loading Aircraft Cargo Door Dimensions



Source: USAF Saber Size-Army Study and AF Reg 76-2

V. OTHER CONSIDERATIONS

There is ample empirical evidence documenting the historic dependence upon transportation for successful military operations. Recognition of this dependence is an essential first step. Next one should acknowledge the less than satisfactory status of our tactical airlift posture. Aircraft age is a factor; the U.S. Army equipment modernization program is an equally important consideration. There are other arguments for modernizing tactical airlift. Hundreds more airfields in Western Europe are accessible to a STOL aircraft, and tactical airlift with air refueling capability can augment strategic airlift. Viewed from any angle, a tactical airlift modernization program should be re-energized and its importance should not be overlooked.

Despite a consensus on the need to modernize tactical airlift and despite the strong supportive arguments, low relative priorities in the budgetary world of competing demands and limited resources often terminate important programs. The recent Presidential decision to create a rapid deployment force and build the C-X may again preempt tactical airlift modernization or may overshadow theater airlift needs if the C-X is intended as both a strategic and tactical aircraft.

The new C-X aircraft should be as big as, or bigger than, the existing C-5 aircraft, with similar outsize cargo carrying capacity. This is imperative if we are to protect our vital interests in the Persian Gulf region. As Secretary Brown said recently, "The other major initiative entails development and production of a new fleet of large cargo aircraft able to carry Army equipment, including tanks, over intercontinental distances." A large, outsize capable C-X aircraft will also contribute to the NATO rapid reinforcement concept. The ability to carry several tanks

to distant locations is a logistical imperative. However, the large size of the C-X could restrict its application as a tactical aircraft which has been indicated as a secondary role of the C-X. Secretary Brown said the new C-X aircraft after an initial deployment phase will assist in intratheater movements.[36] He also said the new C-X will be optimized for the intertheater, not intratheater missions.[37] The secondary intratheater role of the C-X appears to be at cross purposes with the primary role.

The best tactical airlift aircraft should be designed to enable the aircraft to enter and exit remote, unsophisticated airfields, probably with STOL characteristics. The previously mentioned MAC ROC 9-75 required a 28,000 lbs. payload capability. The new C-X in the strategic role should have a 200,000 lbs. payload like the C-5. Altering the size of the tactical C-X in making it larger to adapt it to strategic roles or making the strategic C-X smaller for tactical roles compromises the productivity of the C-X in both roles. In other words, the new aircraft will not be best suited to either role and could perform only marginally in both.

A second nontrivial consideration will be the competing demands for the application of the new C-X in one role or the other. Since a surplus of airlift capability will not exist in the early months of a NATO conflict, competing demands for the C-X will emanate from both the strategic and tactical arenas. If applied in one role, it will not alleviate the shortfall of airlift in the other role. During the first days of a European conflict, demands for airlift within the theater will be considerable. Noncombatants will require transportation to "safe havens" for onward transportation to the U.S. Malpositioned units will require relocation and war reserve stocks must be distributed. Aeromedical evacuation from

battle areas to rearward staging areas will also be needed. Deciding whether to apply the C-X to these missions or to the strategic airlift mission will be perplexing.

When considering the global and theater demands for airlift, the weight of evidence indicates that two aircraft are required. There is considerable merit in the argument to enhance strategic airlift capability, and the C-X will be a welcome addition to that mission. There is also merit in modernizing tactical airlift. The two programs should not necessarily compete; in fact, they should be complementary. The U.S. intercontinental power projection capability will improve dramatically with the C-141, C-5 and a new large C-X. The newer C-130s and a modern tactical airlift aircraft with outsize cargo and STOL capability would provide the best array of airlift aircraft for the European or the Persian Gulf theaters. World War II started with only 118 transport aircraft in the military inventory. WWII ended with over 10,000. Recognizing our dependency on air transportation for successful military operations, two new military airlift aircraft will be better than one.

FOOTNOTES

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8. Martin Van Creveld, Supplying War: Logistics from Wallenstein to Patton (Cambridge University Press, 1977) Chapter 1. Van Creveld covers the background of two centuries of logistics emphasizing transportation dependence.

9. Ibid., chapter 2. Van Creveld discusses the logistics of Napoleon in detail.

10. Ibid., chapters 2 and 5. Chapter 2 deals with Napoleon's 1812 invasion of Russia; chapter 5 treats Hitler's invasion in 1941.

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13. Ibid., Vol. 6, p. 387.

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17. Craven and Cate, The Army Air Forces in World War II, Vol. 6, p. 224, and Roland G. Ruppenthal, United States Army in World War II, Logistic Support of the Armies (Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1959) pp. 161-165.

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20. Joseph M. Heiser, Jr., Lieutenant General, USA, Vietnam Studies, Logistic Support (Washington, D.C.: Department of the Army, 1974) pp. 154 and 163.

21. Berger, The United States Air Force in Southeast Asia, pp. 174-176.

22. Huston, The Sinews of War, p. 669.

23. Ibid., pp. 669-670.

24. Heiser, Vietnam Studies, p. 261.

25. Air Force Regulation 76-2, paragraph 10, page 5, 11 June 1979, provides a detailed description of bulk, oversize and outsize cargo categories. Bulk routinely fits on a 463L pallet (104 inches wide by 84 inches long by 96 inches high). Oversize cargo is a single item that exceeds the 463L pallet dimensions. Outsize cargo exceeds the capabilities of the C-130 and C-141 aircraft and requires use of a C-5. It is cargo that exceeds 828 inches long by 117 inches wide by 105 inches high in any dimension.

26. Military Airlift Command Required Operational Capability, ROC 9-75, 5 December 1975, p. 1.

27. USAF Summary, Directorate of Cost and Management Analysis, Comptroller of the Air Force, March 1979, pp. For 8 - For 9 and For 11 - For 13.

28. Military Airlift Command, ROC 9-75, 5 December 1975, p. 4.

29. The Posture of Military Airlift, Report by the Research and Development Subcommittee of the Committee on Armed Services, House of Representatives, 94th Congress, (HASC No. 94-40) (Washington, D.C.: U.S. Government Printing Office, April 9, 1976) pp. 7-8, 28-30.

30. Committee on Armed Services Report, Department of Defense Authorizations Act, FY 1980, House of Representatives, Report No. 96-166, May 15, 1979, p. 39.

31. U.S. Army, The Troop Program of the Army Establishment, FY 1954, Vol. II, Active Army, Section VI, Chapter II.

32. U.S. Air Force, Assistant Chief of Staff, Studies and Analysis, Strategic Aerial Deployment of Army General Purpose Forces (Saber Size Army), (Washington, D.C.: draft, undated).

33. Ibid., Army Units and Equipment Section, pages unnumbered.

34. Ibid., Appendix D; Unit Weight, Outsize Weight, and Vehicle Dimensions for Combat Forces, pages unnumbered.

35. Ibid., Appendix D; Unit Weight, Outsize Weight, and Vehicle Dimensions for Combat Forces, pages unnumbered.

36. Harold Brown, Secretary of Defense, Department of Defense Annual Report, FY 81, Executive Summary (Washington, D.C.: January 29, 1980) pp. 19-20.

37. Harold Brown, Secretary of Defense, Department of Defense Annual Report, FY 81, January 29, 1980, p. 212.

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Peace Studies Program
Cornell University
170 Uris Hall
Ithaca, New York 14853

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